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ABSTRACT

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MEETING INFORMATION NEEDS IN OHIO

A Report on a TWX Experiment and Elements That Will
Assist in Designing a Reference and Information Network

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Abstract

Ohio libraries are committed to development of a reference and information network, the precise nature of which has yet to be defined. Network design requires careful definition of objectives, planning, and integration of existing operations. Duggan's twelve components are cited as useful in planning. A TWX experiment linking two union catalogs and the State Library is described. In a 172 day period (Feb.-Oct. 1969), 4502 requests (estimated as 44% or less of the current potential volume) entered the system. Of these, 2318 (52%) were found at the first station, 427 (10%) at the second station, and the remaining 38% were unlocated. 539 titles (12%) were located as a result of the connection. Of the 1719 not located, 413 were new publications outside the interlibrary loan code recognized by the union catalogs, and 996 were not identified in 3 bibliographic sources with indications that they were incorrect entries or material outside the scope of the catalogs. The report suggests that 87% of the "proper" requests could be located in Ohio libraries. The mean number of days items were in the system was 2.61, with a range of 1-13. A number of resources and cooperative activities which should be helpful in developing Ohio networks are described. The paper ends with suggestions for next steps including a demonstration of a statewide functional approach to meeting information needs of a specific target group. It emphasizes that the State Library must develop additional planning and coordinating capability and that consideration should be given to strengthening existing resources and to phasing into a reference network through planning and application of systems theory.

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MEETING INFORMATION NEEDS IN OHIO

A Report on a TWX Experiment and Elements That Will Assist in Designing a Reference and Information Network

A businessman, public official, housewife, student or other citizen needs information about a specialized subject, a specific book or magazine article, or an elusive fact that his local library can't supply. Does this mean that the user will have to do without this information?

The growing needs of the public are placing demands on individual libraries which they cannot always meet. To help supply the user with the information quickly, librarians are pooling and coordinating library resources and skills and are also developing new tools. One of these new tools is a reference network.

A statewide reference and information network is one of three key points in the Ohio Library Development Plan (1) adopted in 1968 by the Ohio Library Association and the Ohio Library Trustees Association. The network is also authorized by legislation enacted by the Ohio General Assembly in 1969.

WHAT IS A REFERENCE NETWORK

A reference and information network is an extension of established reference service, which makes it possible to provide more complete and more rapid reference service. When a user's information needs cannot be met in his own library, the librarian determines which source on the network is most likely to have the information. He relays the request to that source and if the information is received, gives it to the user. In this way reference service can be given on a statewide, national or even international basis.

A reference network does not appear magically along with the designation of resource libraries or installation of machines. Instead, its development requires planning and usually involves the integration of the operations which become network components.

The Ohio Library Development Plan is based on the assumption that no library is or can be self-sufficient. It states that a coordinated building of strengths and sharing of resources and services is necessary. A network helps in this by supplementing local resources and enabling libraries of all types to provide services which they could not offer independently.

The Plan implies that the recurring information needs must be met locally. It emphasizes that local libraries must be encouraged to

develop continually and to maintain the resources needed to meet the regular demands of their communities.

Participation in a network by a library should not impair services to its users. Since each local library is responsible for meeting recurring requests, a network must improve, not jeopardize, the service which is given to the local clientele. For this reason, a network is designed with filters which insure that the local resources are exhausted before referrals are made to other sources.

Both the Ohio Library Development Plan and the Ohio Plan for Title III of the Federal Library Services and Construction Act state that a network should develop links with other networks and information sources in Ohio and out of the state. The Plan emphasizes the importance and mutual benefits of connecting the network with the Ohio College Library Center in order to share bibliographic data and information. Links with networks and resources out of the state are also necessary to obtain information that is not available within Ohio.

DECISIONS WHICH MUST PRECEDE NETWORK DESIGN

Network planning must be based upon clear objectives and careful identification of needs and potential user groups. As the *Survey of Ohio Libraries and State Library Services* pointed out "prodigious increase in research, information produced, proliferation of subject specialities and sub-specialities . . .", coupled with immense technological changes affecting the storage, transfer, and use of information both pose problems and offer opportunities to Ohio libraries. (2) Changes in the way information is produced and used make it necessary for librarians to examine new methods for its organization and handling. Information has become specialized and, because of the increase in quantity and specialization of information, many agencies other than libraries are now supplying information. In fact, many people do not even think of going to a library to get information. For these reasons, it is important in planning a reference network to determine the nature of the information to be handled and to identify those whom it will be serving. As an alternative to a single reference network which attempts to provide all types of information to all users, it has been suggested that a number of networks be created, each with a specialized field and a particular clientele. These networks then could be linked together.

The acceptance of the assumptions or alternatives presented here have administrative, organizational and financial implications. For example, what provisions will be made for reimbursement of libraries

The equipment used was Teletype Model 33ASR equipped with Data-Phone. This machine transmits information manually by means of a keyboard or automatically by perforated tape. Installation of the Data-Phone made it possible to connect with Wide Area Telephone Service lines, thereby eliminating line usage charges for long distance transmission. Special equipment allowed transmissions originating in Cleveland to be initiated in Columbus so that the data could be transmitted without a line usage toll. The only cost for local transmission was a monthly telephone connection charge and the basic rental for the teletypewriters.

Staff at each station searched in the usual manner for the requests which were received. Those requests not located at that station were transmitted to the appropriate union catalog for searching. Requests for items not located in either of the two union catalogs were sent to the State Library for verification of entry form. For example, if a title was requested at the Cleveland Regional Union Catalog and could not be located there, the request was sent to the Ohio Union Catalog; if the Ohio Union Catalog could not locate it, the request was then sent to the State Library for verification in one of the three specified sources. Similar patterns were followed for titles requested at the State Library and the Ohio Union Catalog.

Each title requested was assigned a serial number and entered with the date on a log before the request was forwarded to another station. This information along with the bibliographic data on the transmission copy was compiled on a summary sheet which showed the searching sequence, the date, and place the title was found. If the title was located, this information appeared on the summary sheet. In addition, transmission "hard copy" and the punched paper tapes used in transmitting the data were kept for analysis. When the project ended on October 1, 1969, these data were sent to the Center for Documentation and Communication Research at Case Western Reserve University for analysis.

Volume of Transactions

During the eight months of operation, 4502 titles were requested over the TWX network. Of this number, 3731 were requested by the State Library for coordination of interlibrary loans; 261 by the Ohio Union Catalog; and 510 by the Cleveland Regional Union Catalog.

At the first station searched after entering the system 2318 items were located; 427 were located at the second station after entering the system. No locations were found for 1719 items and 38 items had not completed the system when the study was ended. There were 172 working days in the period covered by the experi-

- 9 - A central bibliographic record that provides for location of needed items within the network.
- 10 - Guidelines for what types of information requests may be placed on the network.
- 11 - Criteria and procedures for the evaluation of network performance.
- 12 - Training programs which instruct users and operators of the network.

Miss Duggan suggests a method of testing alternative patterns of a network, using quantitative information about the kinds of requests, the capability of responding to these requests at different points in the network, and the problems involved in moving the requests or information from one point to another. This requires understanding of the relationships among these components and provides a method for measuring possible results of a network - a key factor in network design.

More information is needed on actual situations in Ohio concerning several of these components, such as subject specialization, identification of users, identification of levels of service, and communications and delivery systems.

LINKING OHIO'S UNION CATALOGS BY TWX

Because of the need for information of the type Miss Duggan's article suggests, the State Library in 1969 sponsored an experiment designed to furnish information which would be useful in planning a reference and information network. This experiment was an outgrowth of discussions and studies of Ohio's two union catalogs, the Cleveland Regional Union Catalog and the Ohio Union Catalog.

The Ohio Union Catalog is a file of approximately two million author cards for the adult non-fiction books owned by 32 public and three special libraries which have agreed to make interlibrary loans to other Ohio libraries. The State Library of Ohio operates the catalog in Columbus with three full-time employees.

The Cleveland Regional Union Catalog at Case-Western Reserve University is a file of author cards for approximately three million non-fiction titles. There are 40 contributors: 27 academic, 2 public and 11 special libraries. The catalog has two full-time staff members.

Both union catalogs were started in the 1930's and were initially supported by the Works Progress Administration. They were designed primarily as location tools for interlibrary loan.

The new TWX experiment involving these catalogs was suggested by two reports. *The Survey of Ohio Libraries and State Library Services* recommended that "the Ohio Union Catalog be used as the basis of an expanded reference network." It also suggested that the network establish and maintain links with all libraries and that compatibility with the projected operations of the Ohio College Library Center be considered.

The Comparative Study of The State Library of Ohio Union Catalog and the Cleveland Regional Union Catalog (4) was made in 1967 by Yadwiga Kunciatus and A. J. Goldwyn of the Center for Documentation and Communication Research at Case Western Reserve University. This study examined methods of improving the effectiveness of Ohio's established union catalogs until a sophisticated interlibrary network could be established. It was undertaken at the recommendation of the Advisory Council for LSCA, Title III. The report of this study recommended the merger of the two union catalogs and the editing of their card files. It produced detailed information on the characteristics of the two union catalogs and raised additional questions on how the two union catalogs relate to each other and the types of requests made of them.

The TWX project was developed in order to gain a better picture of the content of the two catalogs and provide experience in network communication between the two. Specifically, the purpose of the TWX project was to: (1) measure the number of items not located in one union catalog that could be located in a search of the other; (2) measure the number of items not located in either union catalog which could be identified in the *National Union Catalog, Cumulative Book Index*, and *Publisher's Weekly*; (3) measure the mean and range of the time lapses for this process and its several elements; (4) determine the costs of the operation; and (5) provide working experience in operating such a system. *Forthcoming Books* was later substituted for *Publisher's Weekly* because of its larger coverage and easier use.

The TWX proposal was reviewed by the Title III Advisory Council on May 9, 1968, approved by the State Library Board on June 11, 1968, and became operational in February, 1969. Paul Agriesti, Assistant to the State Librarian, was appointed coordinator of the project on a part-time basis. He prepared an operations manual for each station and supervised the training of the staff.

Teletype units were placed in the Statewide Loan Section of the State Library, in the Ohio Union Catalog and in the Cleveland Regional Union Catalog.

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ment and the number of titles requested each working day averaged 27. The mean number of days in the network for the 4502 titles was 2.61 and the range was 1 to 13 days. There were 2.4 transmissions per request.

I. Number of Requests Entered, Found, and Not Found: By Station

Station	Entered	Found at First Station	Found at Second Station	Not Found
State Library	3731	2206	418	1079
Ohio Union Catalog	261	42	7	211
Cleveland Union Catalog	510	70	2	429
Total	4502	2318	427 +112 <hr/> 539*	1719

*Total number of requested items which were found as a result of the TWX connection. (The 2206 State Library items would have been located at the Ohio Union Catalog without the TWX connection).

The mean number of days in the network was 1.72 for the 2318 items found at the first station and the range was 1-13 days. An additional 1.32 days were necessary for the 427 items which were transmitted to a second station before being located. The mean number of days in the network for these items was 3.04 and the range was 1-8. The 1719 items which were not located required .66 additional days for verification after the searches in the two union catalogs. The mean number of days in the network for these items was 3.70 and the range was 1-13.

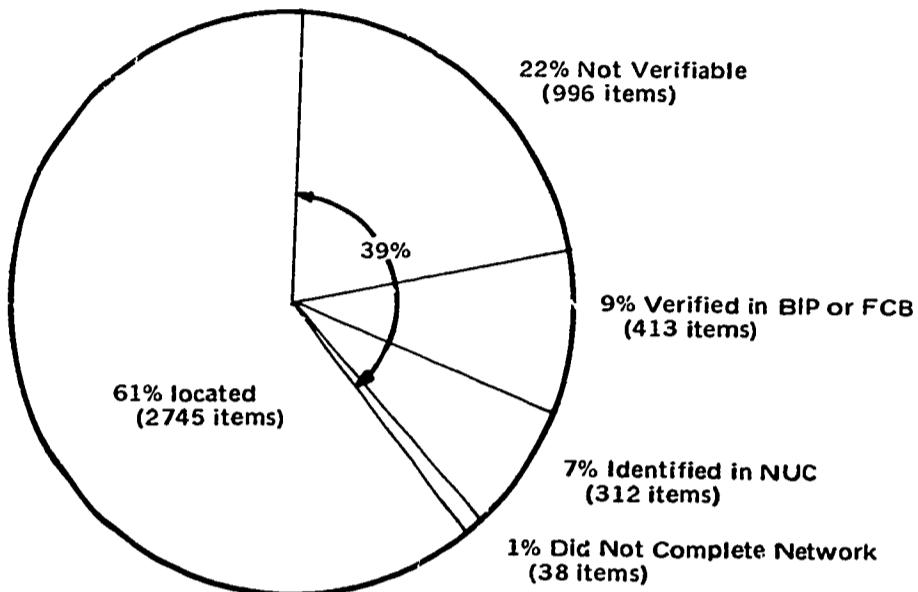
The experiment covered only those items which were not located at the source of origin. Figures for the total volume of requests made of the three stations appearing in the annual reports for the State Library and the Ohio Union Catalog and in the Kuncaitus study suggest that the 4502 requests which were entered into the experimental network probably represent only 44 percent of the potential volume if all unlocated requests had been forwarded during the eight month period. This is estimated on the basis of the past performance

of each station in locating items. From this performance record, it was possible therefore to estimate the potential volume of requests for all three stations during the project as some 11,112 items, or a total annual volume of 14,816 items. Using the 11,112 figure as the estimated volume for the eight month period, it is estimated that 4,680 anticipated requests were not entered into the system during this project period. This raises problems in drawing conclusions and in predicting actual results for the total inasmuch as there is no way of determining the representativeness of the 4502 item sample. Three possibilities could account for the discrepancies: 1) an over-all drop in the volume of requests; 2) percent located increased by as much as 22% at the State Library and 30% at the Union Catalog; or 3) all requests were not transmitted. Because of this, the percentage figures shown can only be taken as an estimate of the potential output of the system.

Results

Of the 4502 requests entered into the system, 2745 or 61% were located. 2206 titles (49%) of the total number of requests entering the system would have been located without the TWX connection. An additional 539 titles (12%) of the total number of requests were located because of the connection. If the 539 items are compared with the estimated potential of 11,112 items, the additional locations as a result of the connection represent 5%. There is no statistical way of estimating the actual percentage since we cannot prove that the 4502 requests constitute a random sample, but the chances for locating an item when the two union catalogs are connected will fall above 5% and may exceed the 12% found in the experiment.

II. Number of Items Located or Not Located			III. Analysis of Items Not Located	
2745	Located	(61%)	413	Listed in <i>Books in Print- or Forthcoming Books.</i>
1719	Not Located	(38%)	312	Listed in the <i>National Union Catalog.</i>
38	Did not Complete System	(1%)	996	Not listed in sources searched.
4502	Total	(100%)	1719	Total Not Located



IV. Analysis of the searching results of the 4502 items entering the network.

Of the 1719 titles that could not be located in the network, 723 were found in one of the three bibliographic sources searched. Of the 723, 411 were found listed only in *Books in Print* or *Forthcoming Books*, indicating that they were probably recent publications and therefore were not within the scope of the union catalogs. The remaining 312 titles were identified in the *National Union Catalog* but probably are unavailable in Ohio since they were not listed in either union catalog. Locations were found for 37 of these titles from citations in the *National Union Catalog*. No locations were given for the remaining 275 titles, but it is assumed that they are available in the Library of Congress.

The 996 remaining titles that could not be located were not found listed in any of the sources searched and for this reason, were considered requests which should have been screened before entering the system. These amounted to 22% of the total volume of requests entering the system. An analysis of "Requests Not Filled" in the Kuncaitus study suggests the nature of those items not located. From the Kuncaitus findings, a certain percent can be expected to be incorrect citations and others to be periodicals, periodical articles, paperbacks, government documents, theses, patents, and proceedings outside the scope of the union catalogs.

The 996 titles not found in any of the three bibliographic sources searched and the 411 titles found only in *Books In Print* or *Forth-*

coming Books total 1407 items or 31% of the total number of requests put into the system. With these eliminated, the system would have located 87% of the items requested in Ohio libraries.

In the Kuncaitus study, only 20% of the items not located were books and it would be reasonable to assume that these might be found in other national bibliographies, or in specialized, technical, and medical bibliographic sources. Another 5% could be located in a government document search. Our conclusion is that some of the 996 titles might be located through intensive searches in specialized bibliographic sources although they are now outside the scope of the two union catalogs.

Observations on the Findings

Analysis of the structure and resources upon which the TWX experiment was based, and of the arrangements and results of the experiment provides some insight to the components identified by Miss Duggan. This shows that a significant number of locations are being provided for interlibrary use, but it also points up some of the problems in effectively using these resources in meeting "the basic and special needs of users".

The nature of the union catalogs suggests guidelines on the types of requests to which they are able to respond. Although the catalogs have been in operation more than thirty years without major change, a significant number of requestors regularly disregard these guidelines (requesting, for example, children's books, periodicals, documents, etc.). The responsibility for libraries to screen their requests is also suggested by ALA and State Library interlibrary loan forms but examination of those forms during the experiment indicated that little verification of titles was made at the local library before requesting from one of the stations. This may be due to the lack of staff, bibliographic tools, motivation, or "know-how" in the local libraries.

This raises serious questions for those planning a network. At what levels should the screening and verification function be placed and how should it be operated? If it is impractical or uneconomic to place and use specialized bibliographic sources in all libraries, at what central point(s) should the searching be done? What costs are involved and how will decisions affect the reader? How important is it for the reader to know immediately the probability of obtaining what he seeks and possible time required to obtain it? How often is the information he seeks already available in other form in the library at which he makes his request?

Included in Miss Duggan's list are requirements for the communication system. Most of the problems encountered in the operation and evaluation of the experiment stemmed from omission of information in the transmitted requests or from incorrect procedures. These indicate the need for improved monitoring to provide immediate feedback on errors or omissions and point out problems to the requesting stations.

The 1-13 day range in the periods of elapsed time from the initiating of a request to the provision of location is significant. Although some stations added procedures which were not part of the experiment, this did not appear to be a major influence in lengthening the time span. Of much greater significance, and of more use in predicting time, is the number of locations to which a request must be referred. In addition to these days, the total turnaround time for a system must also include the time necessary for at least one search in a library which has been identified as owning the material, the time necessary to search it again in a second library if the book is not available, and the time necessary to wrap and send the material through the mails and get it into the hands of the reader. Therefore the number of points through which a reader's request must pass should be kept to a minimum.

If it is considered that 50% of the requests received at the State Library are filled with books mailed the same or following day, and another 16% are met within a mean time of 1.72 days with information on the location of the book in one, two, or three libraries, some goals for Ohio's projected network can be inferred: (1) the number of positive responses must be maintained or improved as volume and complexity of the system increases; (2) the speed of response must be maintained or improved; (3) the system should incorporate such querying and delivery features as necessary to produce the book or information rather than a list of locations; (4) the system must provide rapid negative responses and alternative searches where appropriate; (5) the concept of the network should be defined to include more than interlibrary loans; and (6) the costs of added parts of a network must be charged to these increments of improvement.

This suggests that an objective should encompass:

better than 66% positive response, with intermediate negative feedback, and a total turn-around time not to exceed 10 working days, at an additional cost deemed reasonable for the improved results.

Few, if any, existing statewide networks for public libraries are

known to meet a higher standard. There is good reason to question whether the common manually operated hierachial systems can be designed to excell this standard at reasonable cost under heavy load conditions.

Within the data assembled during this experiment there is a considerable body of additional information suggesting further areas of study. Several analyses are suggested for those titles which were verified in the *National Union Catalog* but were not located in the two union catalogs. Analysis of their subjects, dates of publication, where they can be located, or even by whom they were requested and why, could be useful in planning collaborative development of resources.

Another area in which study is needed but which was not included in this experiment relates to the experience of libraries in attempting to borrow the books for which the union catalogs have provided location information. There is evidence to suggest that libraries are experiencing difficulties and delays in this.

V. Costs

Expenses for Operation of TWX Link:

Salaries	\$ 3547.61*
Travel	79.71
Equipment Rental	<u>3889.61</u>
	\$ 7516.93

Expenses for Evaluation and Reporting:

CWR Analysis	\$ 1700.00
Consultants	980.39
Printing, etc.	<u>569.91</u>
	\$ 3250.30

PROJECT TOTAL

\$10767.23*

*Includes \$1783.61 in Fiscal Year 1969 funds used for salaries which could not be encumbered in advance.

RELATED OHIO STUDIES AND OPERATIONS HELPFUL IN DEVELOPING A REFERENCE NETWORK

The union catalogs have during the past 30 years performed some of the services people expect of a reference network. There are other services, interlibrary operations, and recent studies which provide information and experience helpful in network planning.

Other Ohio Studies

The State Library and the LSCA Title III Advisory Council have initiated studies to provide additional planning information. In 1968, the School of Library Science at Case-Western Reserve University received a grant to study the extra-institutional use made of libraries by Ohio academic personnel. This study (5) analyzed interlibrary loan patterns presently existing among academic libraries and between academic libraries and other types of libraries, and described the types of use students and faculty made of other libraries. In addition to the geographic borrowing patterns which were identified, this study provided information on the volume of requests which had been made between academic institutions.

Another Title III grant was made in 1969 to the Ohio College Library Center for research on a computerized system to link academic libraries for the sharing of bibliographic information. The project sought to simulate the economic and technical characteristics of various types of computers and to evaluate their suitability for an interlibrary network.

In 1968, the State Library, in cooperation with the Library School at Case-Western Reserve University, sponsored a workshop on library automation to orient librarians to the implications of automation and to aid in planning interlibrary cooperation and in formulating guidelines for the development of statewide reference networks and/or technical processing. The 78 participants identified priorities for statewide development: the development of a printed book union catalog; the development of a statewide cataloging center; the development of a reference network; the involvement of school and academic libraries in library development planning; and a study of the manpower needs of libraries.

Identification of Resources

Attention has also been given to the identification and listing of resources on area and statewide levels. The State Library has granted funds to produce union lists of serials in several parts of the state. An LSCA Title I grant was made in 1968 to the Public Library of Dayton and Montgomery County for a union list of serials in the Miami Valley. Ten academic, one public and eighteen special libraries participated. The list represents 8880 titles. It was revised and a second edition issued in 1969 and a supplement to the second edition will be published in 1970. The project was designed to increase services which individual libraries could provide their users and to lessen the burden of interlibrary loans made of the major

academic libraries. The completed list did accomplish this. The geographic borrowing patterns identified in the study of academic library use showed a network of patterns existing among the libraries in the Miami Valley.

Another Title I grant was made in 1968 to the Toledo Public Library for the compilation of a union list of serials in twelve academic, five public and nine special libraries located in northwestern Ohio. The list was published early in 1970.

The most recent union list grant was made in 1969 to the Public Library of Cincinnati and Hamilton County for a list of scientific and technical periodicals held by 40 libraries in the Cincinnati area. The format will be compatible with MARC and a program will be written for making the list available on tape in the MARC format.

Two LSCA Title III grants were made to The Ohio State University, one in 1968 and one in 1969, for the study and formation of a network, Art Research Libraries of Ohio (ARLO). This network of cooperative art libraries will serve specialists in the field of art by sharing information on new acquisitions, preparing master holding lists and working to secure supplementary book funds for the further development of collections of member libraries. Through this grant, eight university, public and special libraries in the State (each with specialized art materials) will share their resources in a cooperative network.

Since 1959, the State Library has operated an Ohio documents depository system. In addition to maintaining the State's most comprehensive reference collection of Ohio official publications, the State Library issues a quarterly list of official Ohio publications and distributes current State documents to 88 depository libraries. To facilitate access to these documents, a Title III grant was made in 1969 to the Ohio Historical Society for a project which will produce a comprehensive list of Ohio documents in the State Library and in selected other libraries. The project will expand and update an Ohio documents checklist published by the State Library in 1964. When the current project is completed, libraries in the State will be able to locate any recorded document published by the State of Ohio.

Operations

The number of requests in the TWX experiment which were put into the system by the State Library suggests the sizeable statewide interlibrary loan program now operated by the State Library. In 1969 the State Library loaned from its collection 30,564 adult non-fiction titles to all types of libraries in Ohio (public libraries

outnumber other types as users of this service). Also in 1969, through searches in the Ohio Union Catalog, locations were furnished for an additional 5911 books which were not available at the State Library or at the libraries where they were first requested.

Libraries also forward reference questions to the State Library. In 1969, 5563 questions were referred to the State Library by all types of libraries throughout the State.

Since 1966 the large collection of education, scientific, and professional periodicals in The Ohio State University libraries has been available to all public libraries in the State through a federally funded contract with the State Library. During the fiscal year 1969, this service was used 200 times by public libraries for the photocopying of 3384 pages of material not available in the State Library.

One of the most forward-looking developments in Ohio is the interlibrary network being designed by the Ohio College Library Center. The Center was established in 1966 through the Ohio College Association. Its purpose is to increase the availability of library resources for use in educational and research programs. Activities of the Center are the research, development, implementation and operation of computerized systems designed to achieve the Center's purpose. Five major sub-systems are being designed; 1) a shared cataloging system based on a central computerized catalog; 2) a remote catalog access and circulation control system; 3) a bibliographic information retrieval system; 4) a serials control system; and 5) a major technical processing system that will computerize most of library processing. At present membership is open only to academic libraries but when it proves technically and economically feasible, other types of libraries will be admitted to the membership.

Eight libraries in Cuyahoga County have established teletype connections among themselves and with one library in adjoining Lake County. The system provides immediate information on the location of specific materials and materials are held at that point for the reader, or sent by interlibrary loan to the library closest to him, or a photocopy is mailed directly to the reader. The system has produced an unexpected volume and pattern of interlibrary lending among the participants.

A number of public, academic, and special libraries in the Cleveland area have organized the Library Council of Greater Cleveland which is studying areas of interlibrary cooperation. An interlibrary delivery system has been proposed for the area, and an operations research study for design of a distribution and communi-

cations system is anticipated.

In Summit County, the Akron Public Library has extended its branch delivery system to serve four other libraries. The system is designed to facilitate interlibrary service and deliveries are made on a weekly basis. An outgrowth of this delivery service is a reference program offered to the participating libraries by the Akron library. Materials answering a request for a title or information are either loaned or photocopies mailed directly to the patron. In the case of factual information, telephone calls are made to the library or to the patron which initiated the request.

NEXT STEPS

Ohio has the interlibrary loan resources to answer many questions that are not now being answered in local libraries. The present volume of interlibrary lending in the state indicated that the potential use of a successful reference network (or group of connected networks) is high. This paper identifies many existing operations which are partial answers to the need for going beyond a single library for information. Although it may appear a simple matter to connect these existing operations, the findings in the TWX experiment suggest that the opposite may be true. Combining of the existing elements would not necessarily promise faster service or more answers. In fact, a very costly network with a complex of channels could prove less satisfactory than existing arrangements unless the result is a well-planned, well-coordinated system designed to achieve the desired results.

Although specifics vary, most systems theories suggest this type of development sequence:

1. The establishment of a general objective.
2. The gathering of additional data which the objective shows is needed.
3. The design and testing of segments of the overall system.
4. The measurement of results.
5. The modification of overall objectives and a repetition of the steps.

Setting An Objective

The Ohio Library Development Plan has outlined a comprehensive goal of providing Ohio citizens all the essential information available in libraries.

"The purpose of this PLAN, is to ensure that every citizen of Ohio will have access to essential library services through development of a system by which information can be shared on a regional or area basis and the development of a network by which local and regional systems can draw upon the specialized resources of the greatest libraries in Ohio and the nation."

Before this goal can be used in the systems design of a reference network, it must be quantified. This immediately suggests that the terms "all" "essential" -- even "information" -- are difficult to define and to measure. An early task must be to agree upon the expectations for the system. An attempt to quantify also reveals a lack of precise information about what happens when a library receives a report on the location of a book it seeks, when a library receives a request for interloan, or when interlibrary requests are not routed through the State Library.

Collecting Information

An attempt to set network objectives in measurable terms would reveal many more information gaps, but two can be anticipated. They are:

1. The identification of existing resources and the collection and maintenance of information about the nature of these resources.
2. The nature of existing operational patterns that would be useful in predicting future cause and effect of network operations.

Design and Testing

Several new segments need to be designed and existing elements need to be integrated into new configurations under conditions which permit the measurement of results. The strengthening and coordination of present resources and projects should not be overlooked.

Measurement

All efforts at gathering information and experimenting with operations must relate to measures of network performance as used in the objective. The measures must be stated so precisely that the characteristics of future applications can be predicted with some degree of certainty. Otherwise, each new test becomes "trial and error" without adding to a base fund of knowledge. At some point, system designers must measure how a computerized data bank compares with manual operations under given conditions. They will need to compare costs, speed and accuracy of a telephone conversation with a tape transmission and many other factors.

Future Directions

These steps of setting objectives, gathering information, design and testing, and measuring can be undertaken so that each one is completed before the following step begins. Too frequently, this has the disadvantage of delaying the results until long after a large investment in time and equipment is made. It is expensive to correct mistakes or even modify objectives in such an approach. The establishment of a reference network and announcing that "everything in libraries is now available to anyone" carries these hazards. The dimensions of current interloan activities in Ohio makes Ohio especially susceptible to these pitfalls due to the number of people and size of expenditures required for equipment.

The alternative generally accepted in such a situation is called "phasing in." Some part of setting objectives, gathering information about patterns and design and testing of operations can be built into a single project of limited scope. Ohio has the option of at least two approaches to phasing in a reference network. Limits can be geographic as in the reference work which has been performed in 10 counties by the Napoleon Center, or limited to one field as in the Art Research Libraries of Ohio project. The second or "functional" approach makes possible a choice of target groups such as professional educators or local government officials and offers several advantages. Rigid precautions, however, must be taken in any project where experimental controls are involved. A significant finding of the TWX study was that librarians and staff find it difficult to understand what Blasingame calls the "non-success oriented" elements in operations designed to test hypotheses or gather information about the processes involved (6).

The demonstration which is limited to functional coverage offers several advantages over one limited geographically. It permits an

emphasis on pinpointing and strengthening specific resources. It allows more precise study of existing needs. The impact on the selected groups is easier to measure. The use of control groups or alternative approaches in different areas becomes possible. At the same time a degree of statewide experience and impact is possible. A functional coverage also offers some advantages in training, coordination, corrective feedback, and measurement. If the TWX experiment is typical, these communication factors will be crucial in obtaining useful information.

Previous experience including that of the statewide BOOKS/JOBS project suggest several elements of any such demonstration. These include:

1. Broad involvement in planning and designing the project.
2. Special efforts to interpret the purposes of the project to operational personnel.
3. Programs to allow participants to discover the need for the services.
4. The provision of resources to local libraries as a means of strengthening their capabilities and as an inducement to participate and facilitate involvement.
5. Centrally organized staff training programs, and information campaigns for the target group to assure a measure of standardization.
6. The necessity for built-in measures of results — perhaps to the extent of training participants in record maintenance and evaluation techniques.

Any of the possible courses of action given here presuppose a centralized coordinating agency which can gather and interpret data collected. The TWX experiment shows the need for such coordination and underscores the fact that the State Library lacks sufficient manpower to give these matters the attention they deserve. No matter which method of establishing a reference network is chosen, the centralized capability for relating individual activities to the general objectives of the network is essential. The eventual success or failure of reference and information networks will hinge upon the careful application of systems theory to the problem of providing information to supplement local resources.

These conclusions suggest three areas of concern in the development of the reference network called for in the Ohio Library Development Plan:

1. The establishment of a centralized coordinating and information gathering capability.
2. Continued efforts to identify and strengthen existing resources.
3. Development of a continuous planning process for phasing in and operation of a network based on careful application of systems theory.

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